



## Complete Summary

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### GUIDELINE TITLE

Ankle and foot.

### BIBLIOGRAPHIC SOURCE(S)

Work Loss Data Institute. Ankle and foot. Corpus Christi (TX): Work Loss Data Institute; 2005. 122 p. [129 references]

### GUIDELINE STATUS

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

## COMPLETE SUMMARY CONTENT

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INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT

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## SCOPE

### DISEASE/CONDITION(S)

Work-related ankle and foot disorders

### GUIDELINE CATEGORY

Diagnosis

Evaluation

Treatment

### CLINICAL SPECIALTY

Emergency Medicine

Family Practice

Internal Medicine

Orthopedic Surgery  
Podiatry

#### INTENDED USERS

Advanced Practice Nurses  
Health Care Providers  
Health Plans  
Nurses  
Physicians

#### GUIDELINE OBJECTIVE(S)

To offer evidence-based step-by-step decision protocols for the assessment and treatment of workers' compensation conditions

#### TARGET POPULATION

Workers with occupational disorders of the ankle and foot

#### INTERVENTIONS AND PRACTICES CONSIDERED

1. Accommodative modalities (taping, orthoses)
2. Activity restrictions
3. Operative treatment of Achilles tendon rupture
4. Anti-inflammatory medications
5. Bed rest
6. Bone scan
7. Bracing
8. Cast immobilization
9. Cold packs
10. Computed tomography
11. Elastic bandage
12. Exercise
13. Functional treatment
14. Ankle fusion
15. Heat therapy in combination with stretching
16. Ice packs
17. Imaging studies
18. Immobilization
19. Therapeutic injections
20. Lace-up ankle support
21. Lateral ligament ankle reconstruction
22. Lineal tomography
23. Magnetic resonance imaging (MRI)
24. Mechanical treatment
25. Narcotics
26. Tension night splints (TNS)
27. Nonprescription medications
28. Orthotic devices
29. Osteotomy
30. Ottawa Ankle Rules

31. Patient education
32. Physical therapy
33. Radiography
34. Rest, ice, compression, & elevation (RICE)
35. Return to work guidelines
36. Semi-rigid ankle support
37. Stretching
38. Surgery
39. Tai Chi
40. Taping
41. Therapeutic exercise
42. Diagnostic ultrasound
43. Work modifications

The following interventions were considered, but are either not currently recommended or not specifically included as major recommendations:

1. Actovegin
2. Biofeedback
3. Chiropractic
4. Continuous-flow cryotherapy
5. Corticosteroids
6. Diathermy
7. Dorsiflexion night splints
8. Electron generating device
9. Extracorporeal shock wave therapy (ESWT)
10. Intertarsal or subtalar fusion
11. Heparin
12. Heel pads
13. Insoles with magnetic foil
14. Iontophoresis
15. Laser therapy
16. Low-intensity laser therapy
17. Use of prosthetic ligaments, plastic implants, calcaneus osteotomies
18. Magnets
19. Manipulation
20. Massage
21. Phonophoresis
22. Prolotherapy
23. Sclerotherapy
24. Shock wave therapy, extracorporeal (ESWT)
25. Surgery
26. Transcutaneous electrical neurostimulation (TENS)
27. Therapeutic ultrasound

#### MAJOR OUTCOMES CONSIDERED

- Sensitivity and specificity of diagnostic tests
- Effectiveness of treatment (e.g., in relieving pain, swelling, and tenderness and improving joint stability)

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)  
Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Ranking by quality within type of evidence:

- a. High Quality
- b. Medium Quality
- c. Low Quality

### METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses  
Systematic Review

### DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

### METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

### RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

### COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

## METHOD OF GUIDELINE VALIDATION

Not stated

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not applicable

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary. The recommendations that follow are based on the previous version of the guideline.

#### Initial Evaluation and Presumptive Diagnosis of Ankle Injuries

The injury should be classified into a presumptive diagnosis, which will dictate the path of care. After a complete, definitive evaluation is finished, the injury may, in some cases, need to be reclassified. Subsequent to a thorough evaluation, the diagnosis may change (e.g., if the physician classifies a patient with a sprain and the x-rays subsequently show a fracture).

##### Initial Evaluation

- Ascertain the type of trauma (inversion/eversion or dorsiflexion/plantar flexion).
- Determine whether the problem is acute, subacute, chronic, or of insidious onset.
- Determine the severity and specific anatomic location of the pain.
- Assess the ability of the patient to bear weight, from no to full weight-bearing ability.
- Search for any evidence of an open or penetrating wound.
- Search for any evidence of deformity (anterior/posterior or lateral/medial).
- Test the range-of-motion of the joint.
- Document any present medication.
- Document any history of systemic disease or previous ankle injury or disability.

##### Presumptive Diagnosis (See the original guideline document for ICD-9 codes)

- Fracture or dislocation
- Sprain, sprain-fracture, or contusion
- Laceration
- Tendonitis
  - Achilles
  - Anterior tibial
  - Posterior tibial or peroneal
- Traumatic arthritis, acute episode
- Calcaneal spur

- Hallux valgus
- Plantar fascial fibromatosis
- Systemic disease (e.g., gout, rheumatoid arthritis, psoriasis)

## Fracture or Dislocation

### A. Definitive Evaluation

- Record a history of the cause of the injury.
- Search for any evidence of an open wound in the vicinity of the fracture.
- Perform a clinical examination for deformity, tenderness, or ecchymosis or associated nerve, neurovascular, or tendon injury.
- Evaluate for evidence of joint instability.
- Search for any evidence of dislocation or arterial vascular compromise (cold, dusky foot with loss of sensation), pulse, and possibly sensation. If found, an immediate reduction should take place (prior to x-rays if necessary).
- Perform an evaluation for an associated injury of the foot.
- X-ray the ankle (two views). Special views such as mortise should be obtained when necessary (Stiell et al., 1994).

### B. Initial Therapy

- Simple, undisplaced stable fractures with no component of the fracture at the level of the ankle mortise can be treated by the primary care physician.
  - A trilateral splint should be applied initially for two to three weeks. The patient will need crutches and should avoid weight bearing. Swelling is controlled with constant elevation above the heart.
  - Ice and elevation for 24 to 48 hours is appropriate.
  - Post-fracture, two to three weeks (after the swelling has subsided), it is appropriate to apply a fiberglass cast with the foot at 90 degrees. This allows the addition of a shoe for conversion to a walking cast one to three weeks after the cast has been applied. Weight-bearing is progressed to 50% with crutches until six weeks post-injury, when full weight-bearing is allowed and crutches are discontinued.
  - Analgesics and/or nonsteroidal anti-inflammatory drugs for up to two weeks are appropriate. Pain is usually due to swelling and is best controlled with elevation of the ankle and foot. An initial intramuscular (IM) pain injection is often indicated.
  - The patient should be rechecked seven to ten days after the fracture, seven to ten days after beginning partial weight-bearing, and after progressing to full weight-bearing.
  - X-rays are repeated during the above visits and after the cast is removed at six weeks.
  - Physical therapy (one to five visits) to teach patient range-of-motion and muscle-strengthening exercises may be needed after cast removal.
  - If using a removable cast, starting at four weeks the patient should be allowed to begin gentle range-of-motion exercises with the cast off.

- Prescribe level of activity at work and job modifications at each visit.
  - Nondisplaced, bimalleolar fractures should be referred to an orthopedic surgeon, as they are potentially unstable.
  - All other ankle fractures should be referred to an orthopedic surgeon. Compound fractures, when appropriate, should have a tetanus toxoid injection before being referred to an orthopedic surgeon.
- C. Secondary Evaluation for Patients with Persistent Symptoms or Minimal Improvement after Six Weeks of Therapy
- Review for compliance of the employee and employer to therapy programs and job modifications and restrictions. Also review for insurance company cooperation.
  - Evaluate for delayed union, malalignment, or signs of associated tendon or nerve injury or signs of reflex sympathetic dystrophy.
  - Promptly refer to an orthopedic surgeon if one of these conditions is found; otherwise continue therapy.

#### Official Disability Guidelines (ODG) Return-To-Work Pathways

Closed reduction, sedentary/modified work: 1-7 days

Closed reduction, standing work without cast: 21 days

Open reduction, internal fixation, sedentary/modified work: 14 days

Open reduction, internal fixation, standing work without cast: 84 days

Comorbidity fracture blister, add: 21 days

(See ODG Capabilities & Activity Modifications for Restricted Work under "Work" in the Procedure Summary of the original guideline document)

- D. Other Considerations
- Posterior fracture dislocation of the ankle is a serious injury and is frequently associated with neurovascular compression and with a cyanotic, cold foot. It is sometimes prudent to immediately reduce the dislocation, even prior to obtaining x-rays. "Pure" dislocations of the ankle are rare.
  - Trimalleolar fractures and Pott's fractures (fractures of the distal fibula with torn deltoid ligament) are more commonly associated with this injury.
  - An open wound in the vicinity of a fracture makes it a compound fracture, even if no clear connection to the fracture site is apparent. All compound fractures should be referred to an orthopedic surgeon immediately for care.
  - Neurovascular injuries are a consideration in any fracture, particularly in the ankle, knee, wrist, and elbow. In the ankle, the common injured structures include the posterior tibial artery (which wraps around the posterior-inferior border of the medial malleolus) and the sural nerve (distal to the lateral malleolus). Therefore, it is important to evaluate

the foot distal to the fracture to determine if there is evidence of nerve or vascular damage. The sural nerve is sensory and supplies the lateral foot. Vascular injury is detected by cyanosis and coldness of the foot. Since pulses are often difficult to palpate in a swollen ankle, a Doppler examination should be employed if a pulse is not felt. Vascular competence is further checked by comparing the circulatory return of a blanched nailbed to the contralateral side.

- The standard anteroposterior and lateral ankle x-ray occasionally needs to be enhanced by special views. For example, a mortise view detects small but significant widening of the ankle mortise that requires surgical repair for torn ligaments.
- Undisplaced ankle fractures, except those having a component of the fracture at the level of the ankle mortise, can be treated by the primary care physician. If the fracture line of the tibia or fibula is adjacent to the level of the mortise, it is prudent to refer the patient to an orthopedic surgeon. Although these fractures may initially appear stable, they are unstable and prone to displace within a few days. Generally, they are treated surgically.
- A trilateral splint is used for the initial splinting of stable fractures of the ankle until the swelling subsides. The splint is then replaced by one of several types of casts (below the knee nonweight-bearing cast, walking cast, or removable cast boot). The splint is applied in the following manner:

With the patient in the prone position, the knee flexed to 90 degree angle, with an assistant or family member supporting the ankle in the neutral position by the great toe, a four-inch Webril or case padding is wrapped from the base of the toes to the tibial tubercle. Next, five layers of 5 x 30 inch plaster are applied, starting at the back of the upper calf and passing over the heel to the base of the toes and doubling back, and are smoothed. Then five layers of a 5 x 30 inch plaster are applied laterally, beginning high on the calf, passing over the lateral malleolus, under the plantar aspect of the foot, and up the medial side as far as possible. This is held in place by an Ace or Coban bandage. A Coban bandage has less give than an Ace bandage and should be applied with just one overlapping layer to avoid excess compression.

#### E. Sprain, Sprain-fracture, or Contusion

##### ODG Return-To-Work Pathways

Ankle strapping/soft cast, mild sprain: 1 day

Ankle strapping/soft cast, severe sprain, sedentary/modified work (10 days crutches): 4-5 days

Ankle strapping/soft cast, severe sprain, manual/standing work: 21 days



Achilles tendon repair, sedentary/modified work: 10 days

Achilles tendon repair, manual/standing work, without cast: 49-63 days

- A definitive evaluation of a sprain is important, as sprains are the most common injury of the ankle, and inversion sprains make up the majority. Eversion sprains may be more severe due to their association with syndesmosis injuries. One classification of sprains is Grades I, II, and III (least serious to most serious), and it is helpful to classify sprains in this manner as a guide to the initial therapy and prognosis. (Ankle sprains can range from stretching [grade 1] to partial rupture [grade 2] to complete rupture of the ligament [grade 3] [Litt, 1992].) Evaluations for a sprained ankle include: check for the area of maximal tenderness; on the lateral side, examine the anterior talofibular ligament, the calcaneofibular ligament, and the posterior talofibular ligament; check the syndesmosis area; examine the mid-tarsal joint; check for injuries to the posterior tibial and peroneal tendons; examine for possible fracture of the base of the fifth metatarsal, anterior process of the calcaneus, osteochondral lesion of the talus, lateral process of the talus; and check for tenderness of the medial and lateral malleoli.
- A sprain-fracture refers to the small flakes of bone avulsed from the calcaneus or talus in sprains of the ankle. These flakes represent small avulsions of bone attached to the injured calcaneofibular ligament or the talofibular ligament. Sprain-fractures are treated in the same manner as the grade of sprain they represent and can be treated by the primary care physician unless they are clinically a Grade III.
- Peroneal tendon injuries are associated with Grades II and III ankle sprains of the inversion type. Peroneal tendons (longus and brevis) traverse distal to the lateral malleolus, and their retaining retinacula are sometimes torn with sprains of the ankle. Examination includes dorsiflexion/eversion of the foot and having the patient resist passive inversion. This forces the injured tendon to ride up over the lateral malleolus. Treatment is a short leg cast with ankle in 30 degree plantar flexion for six weeks.
- Traction injuries to the peroneal and sural nerves can occur with sprains of the ankle. They are detected by careful palpation of the nerves for tenderness. The sural nerve runs posterior and distal to the lateral malleolus. Injury to these nerves may occasionally lead to reflex sympathetic dystrophy. The Ottawa rules, developed by Stiell et al, identify those cases of ankle sprain that need x-rays. Fractures commonly associated with ankle sprains include the following:
  - Talus (lateral process) fracture
  - Osteochondral fractures of the dome of the talus (may require magnetic resonance imaging [MRI] or bone scan of the tibial-talar joint for diagnosis)
  - Calcaneus-anterior process fractures
  - Fracture of base or shaft of fifth metatarsal
- Stress x-rays may be indicated in acute sprains, but they are more commonly used in unstable chronic sprains to delineate the degree of

ligamentous laxity present. Stress x-rays are usually performed by a radiologist or an orthopedic surgeon.

- Syndesmosis refers to joints, such as the tibiofibular joint, held by ligaments without articular surfaces. The syndesmosis of the ankle is the tibiofibular ligament between the distal fibula and the tibia. Disruption of the tibiofibular ligament will demonstrate tenderness over that area and can be detected by a positive "squeeze test" and a special x-ray view of the ankle with the tibia held firmly and the foot rotated externally (which may show widening of the ankle mortise). This injury is often a surgical problem and should be referred to an orthopedic surgeon for treatment.
- The squeeze test is accomplished by grasping the tibia in the palm of one hand and the fibula in the other and squeezing them together in the lower third. Pain in the area just above the ankle mortise on the lateral side is a sign of syndesmosis injuries.
- The drawer test is for abnormal anterior/posterior motion of the ankle following a sprain. It is performed by firmly applying pressure on the anterior distal tibia and grasping the os calcis posteriorly and pulling anteriorly. Excess motion when compared with the contralateral side is judged a positive test or positive "anterior drawer sign."
- Inversion instability is tested by holding the distal end of the tibia and fibula firmly. The calcaneus is grasped with the other hand into maximum inversion and eversion. Comparison is made with the contralateral side.
- Sprains that are not responding to therapy are often an indication to x-ray or repeat x-ray to check for fractures not previously detected, such as osteochondral fractures of the talus.
- Approximately 10 to 20% of all sprains will either fail conservative management or will be severe enough to require orthopedic evaluation. A review of 12 studies comparing surgery with functional treatment shows that controlled movement is the treatment of choice for lateral ligament injuries of the ankle. Patients who had failed conservative therapy and delayed surgical repair had as good results from the surgery as patients who had primary surgery. Possible contraindications to nonsurgical management of ankle sprains that require orthopedic referral include the following:
  - Associated displaced osteochondral fracture
  - Displaced anterior tibial lip fracture
  - Chronic instability
  - Combined medial and lateral ligamentous injuries

#### Laceration

##### ODG Return-To-Work Pathways

Minor: 0 days

Major, clerical/modified work: 3 days

Major, manual work: 8 days

Major, heavy manual work: 14 days

Tendon repair, clerical/modified work: 14 days

Tendon repair, manual work: 91 days

- A laceration produced by crush injury needs an x-ray to rule out any underlying fracture and to answer any question of penetration of the joint or a foreign body in the wound.
- Neurovascular and tendon function need evaluation with any laceration around a joint. No anesthesia should be used in the wound until the sensation has been checked distal to the laceration and the function of the tendons has been identified as intact.
- Antibiotic therapy for contaminated lacerations should include both anti-staphylococcal and broad-spectrum coverage.

### Tendonitis

#### ODG Return-To-Work Pathways

Without surgery, clerical/modified work: 0 days

Without surgery, manual/standing work: 5-7 days

With surgery, clerical/modified work: 7-10 days

With surgery, manual/standing work: 42-49 days

- The Thomas test is used to diagnose Achilles tendon rupture. Squeeze the calf with the patient in a prone position and with the foot off the examining table. With an intact tendon, the foot will plantar flex. This is a very accurate test.
- Laboratory studies are usually not necessary. However, with persistent symptoms, an arthritis panel and a serum uric acid test may be necessary.
- Achilles tendonitis requires initial therapy of an Achilles stretching program. The latter can be implemented by a single visit to a physical therapist or may be taught by the physician. Additionally, a heel lift in the shoe may be of value. Short-term immobilization and even non-weight-bearing are also commonly needed. Because there is an association with late rupture of the tendon, most physicians suggest it is inappropriate to inject steroids into the bursa or the tendon sheath.
- An x-ray of the ankle is appropriate to rule out other pathology, including bone pathology, in the presence of persistent tendonitis with little improvement. Noncompliance by the patient with the stretching program is frequently implicated with slow improvement of symptoms.
- Achilles tendonitis patients who have no improvement after 30 days of therapy need an orthopedic consultation to assist in defining appropriate therapy and to rule out complicating factors.
- Patient noncompliance is the cause of failure to improve in up to 90% of cases. The majority of the remaining cases are related to

unrecognized associated pathology such as osteochondral fractures in ankle injuries.

#### CLINICAL ALGORITHM(S)

None provided

### EVIDENCE SUPPORTING THE RECOMMENDATIONS

#### REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

#### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

During the comprehensive medical literature review, preference was given to high quality systematic reviews, meta-analyses, and clinical trials over the past ten years, plus existing nationally recognized treatment guidelines from the leading specialty societies.

The type of evidence associated with each recommended or considered intervention or procedure is ranked in the guideline's annotated reference summaries.

Ranking by Type of Evidence:

1. Systematic Review/Meta-Analysis
2. Controlled Trial-Randomized (RCT) or Controlled
3. Cohort Study--Prospective or Retrospective
4. Case Control Series
5. Unstructured Review
6. Nationally Recognized Treatment Guideline (from [www.guideline.gov](http://www.guideline.gov))
7. State Treatment Guideline
8. Foreign Treatment Guideline
9. Textbook
10. Conference Proceedings/Presentation Slides

### BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

#### POTENTIAL BENEFITS

These guidelines unite evidence-based protocols for medical treatment with normative expectations for disability duration. They also bridge the interests of the many professional groups involved in diagnosing and treating disorders of the ankle and foot.

#### POTENTIAL HARMS

Open operative treatment of acute Achilles tendon ruptures significantly reduces the risk of rerupture compared to non-operative treatment, but produces a significantly higher risk of other complications, including wound infection.

## CONTRAINDICATIONS

### CONTRAINDICATIONS

Possible contraindications to nonsurgical management of ankle sprains that require orthopedic referral include the following:

- Associated displaced osteochondral fracture
- Displaced anterior tibial lip fracture
- Chronic instability
- Combined medial and lateral ligamentous injuries

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better

### IOM DOMAIN

Effectiveness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Work Loss Data Institute. Ankle and foot. Corpus Christi (TX): Work Loss Data Institute; 2005. 122 p. [129 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

2003 (revised 2005)

#### GUIDELINE DEVELOPER(S)

Work Loss Data Institute - Public For Profit Organization

#### SOURCE(S) OF FUNDING

Not stated

#### GUIDELINE COMMITTEE

Not stated

#### COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Not stated

#### FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

#### GUIDELINE STATUS

Note: This guideline has been updated. The National Guideline Clearinghouse (NGC) is working to update this summary.

#### GUIDELINE AVAILABILITY

Electronic copies of the updated guideline: Available to subscribers from the [Work Loss Data Institute Web site](#).

Print copies: Available from the Work Loss Data Institute, 169 Saxony Road, Suite 210, Encinitas, CA 92024; Phone: 800-488-5548, 760-753-9992, Fax: 760-753-9995; [www.worklossdata.com](http://www.worklossdata.com).

#### AVAILABILITY OF COMPANION DOCUMENTS

Background information on the development of the Official Disability Guidelines of the Work Loss Data Institute is available from the [Work Loss Data Institute Web site](#).

#### PATIENT RESOURCES

None available

#### NGC STATUS

This summary was completed by ECRI on February 2, 2004. The information was verified by the guideline developer on February 13, 2004. This NGC summary was updated by ECRI on March 24, 2005.

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